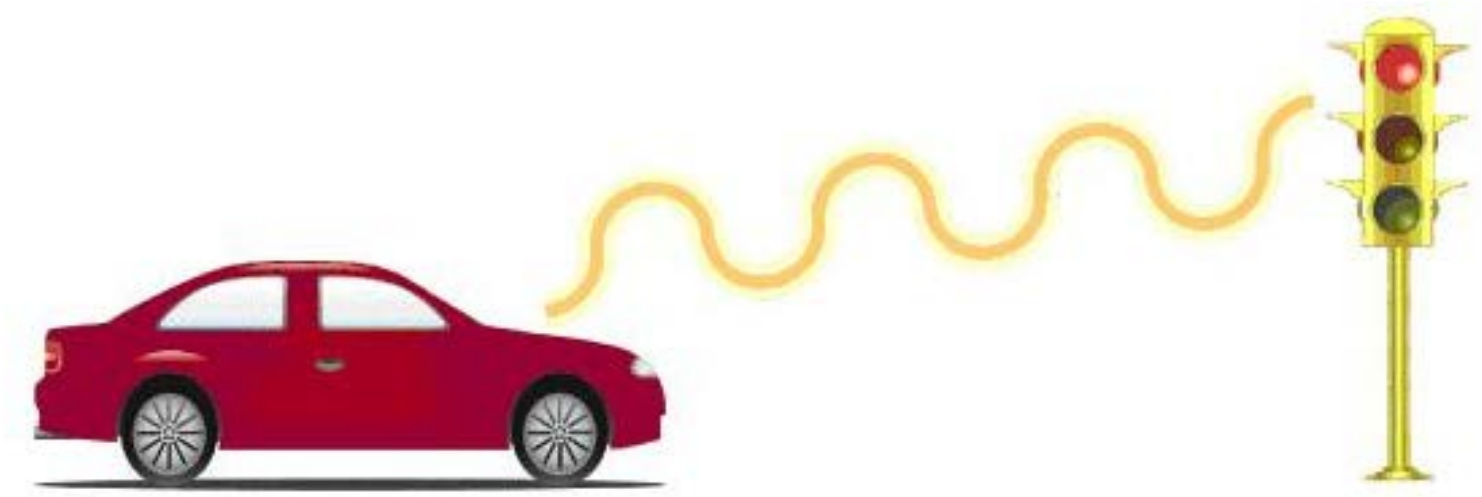
USDOT Connected Vehicle Activities Vehicle to Infrastructure Workshop



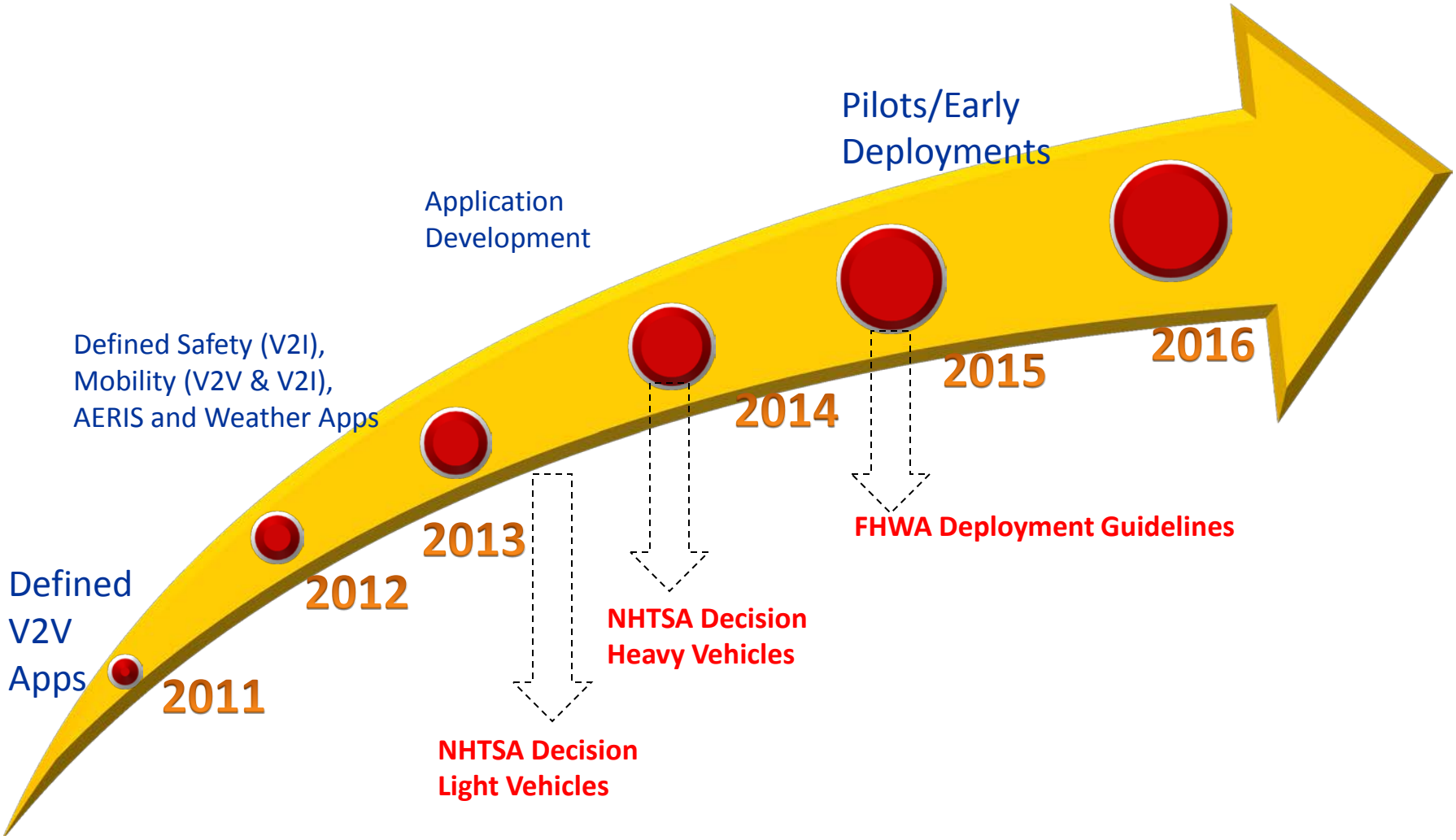
FHWA 2015 V2I Deployment Guidance

Graphic Source: USDOT

Welcome

- Robert Arnold
  Federal Highway Administration
  Director, Office of Transportation Management
- Jeffrey Lindley
  Federal Highway Administration
  Associate Administrator Office of Operations

The Path To Deployment



Graphic Source: USDOT

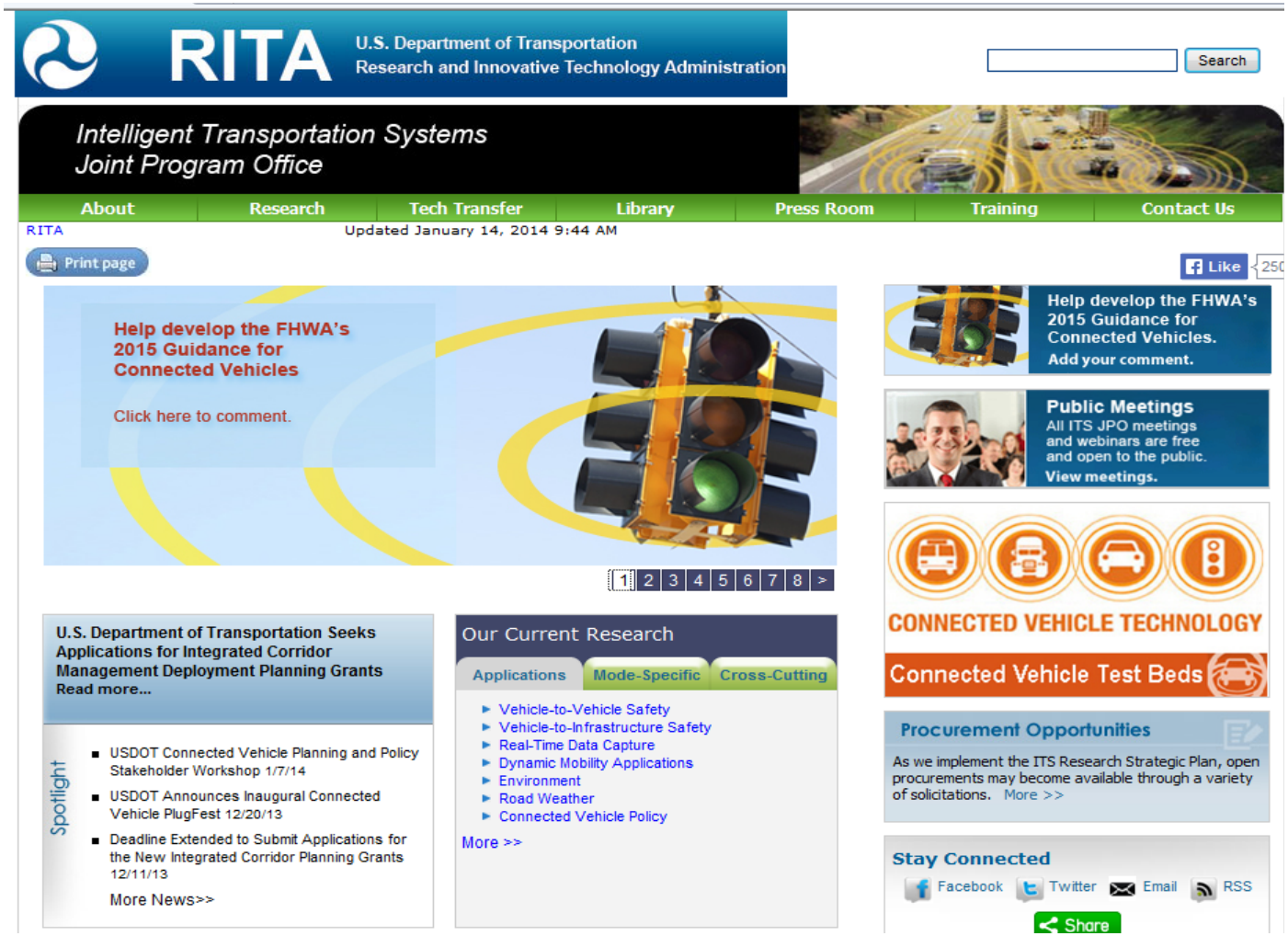
FHWA's Plans and Objectives
Guidance on Infrastructure Implementation

- Guidance - not regulation
- What and how to implement infrastructure and supporting systems
  - Guidelines
  - Best Practices
  - Toolkit
- Supporting high-priority applications
  - V2I safety applications (crash warnings at traffic signals, etc.)
  - Dynamic mobility
  - Road-weather
  - Environmental
- Based on DOT research and AASHTO analysis of infrastructure needs and deployment approaches

Structure of the meeting

- What's Happening?
- What are your needs?
  - Planning
  - Design and Integration
  - Institutional and Legal
  - Implementation
  - Operations
  - Transit/Multi-Modal
- How do you stay engaged?

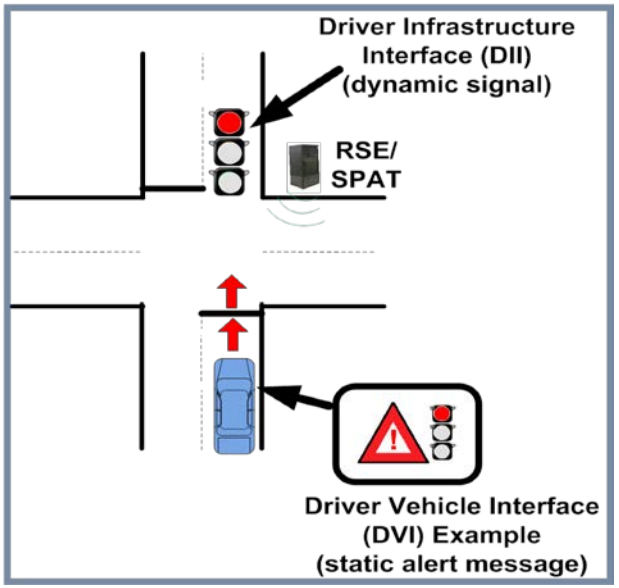
How do you stay engaged?



Graphics/Image Source: USDOT

What is Happening?

- Ben McKeever and Deborah Curtis, Federal Highway Administration, Turner-Fairbank Highway Research Center



Graphic/Image Source: USDOT

AASHTO Footprint Analysis

- In 2012 USDOT requested AASHTO to form a team to conduct a national connected vehicle field infrastructure footprint analysis
  - Consider broad range of CV apps and scenarios
  - Include safety, mobility and environmental apps
  - Include light vehicles, transit, commercial vehicle and pedestrian apps
  - Include urban, rural, freeway, arterial, and freight/ intermodal facilities, and land border crossings
- Task awarded and initiated in November 2012

Footprint Work Plan

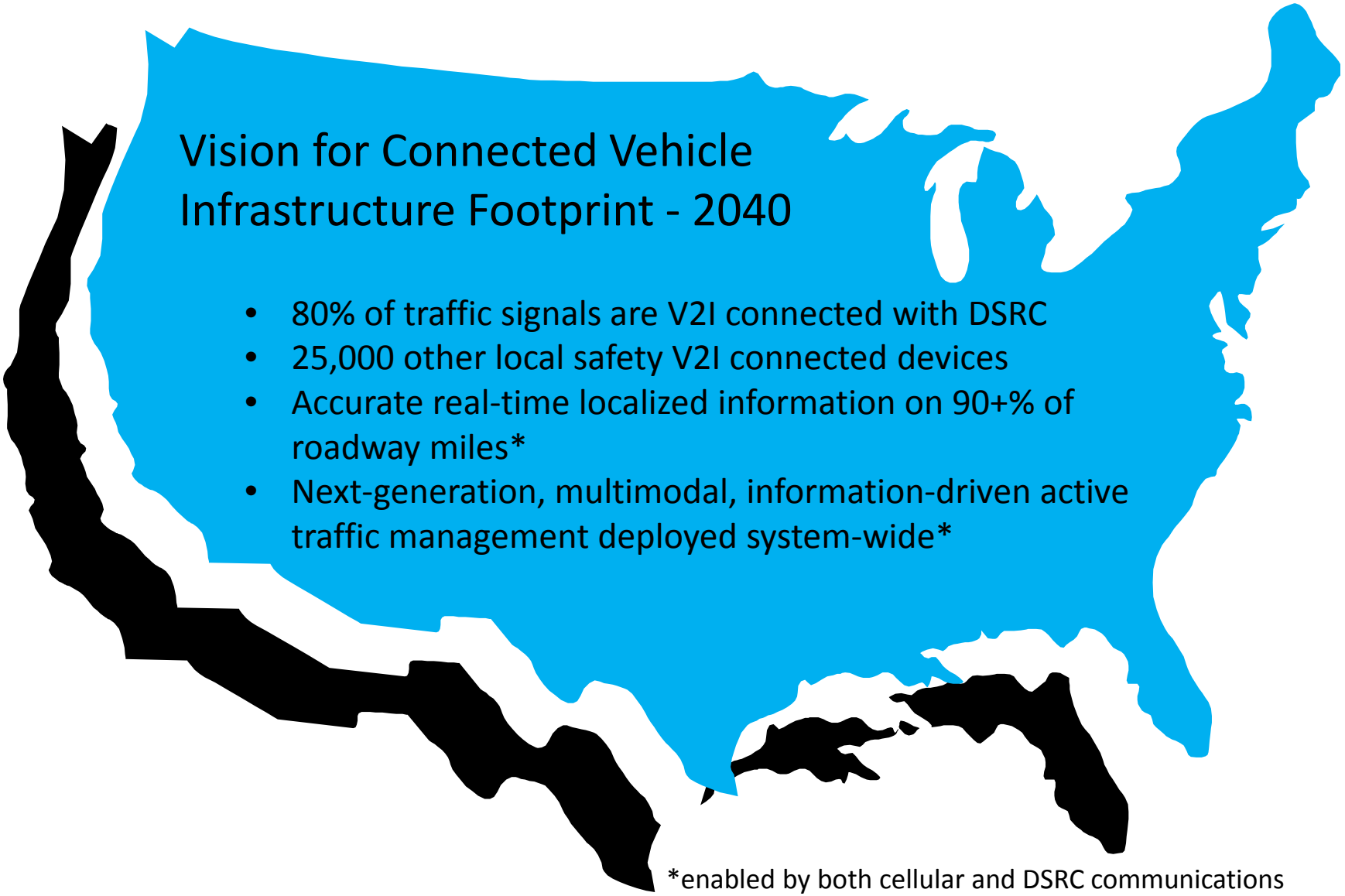
Completed Tasks

- Develop a Tech Memo to initiate engagement with State and local agencies (Task 3)
- Assess the range of CV applications to identify deployment bundles (Task 4)
- Develop deployment concepts (Task 5)

Tasks Underway

- Develop deployment scenarios, a preliminary national footprint and cost estimates (Task 6) – Feb 2014
- Develop a Final Report (Task 7) – March 2014

Vision for Connected Vehicle Infrastructure Footprint - 2040



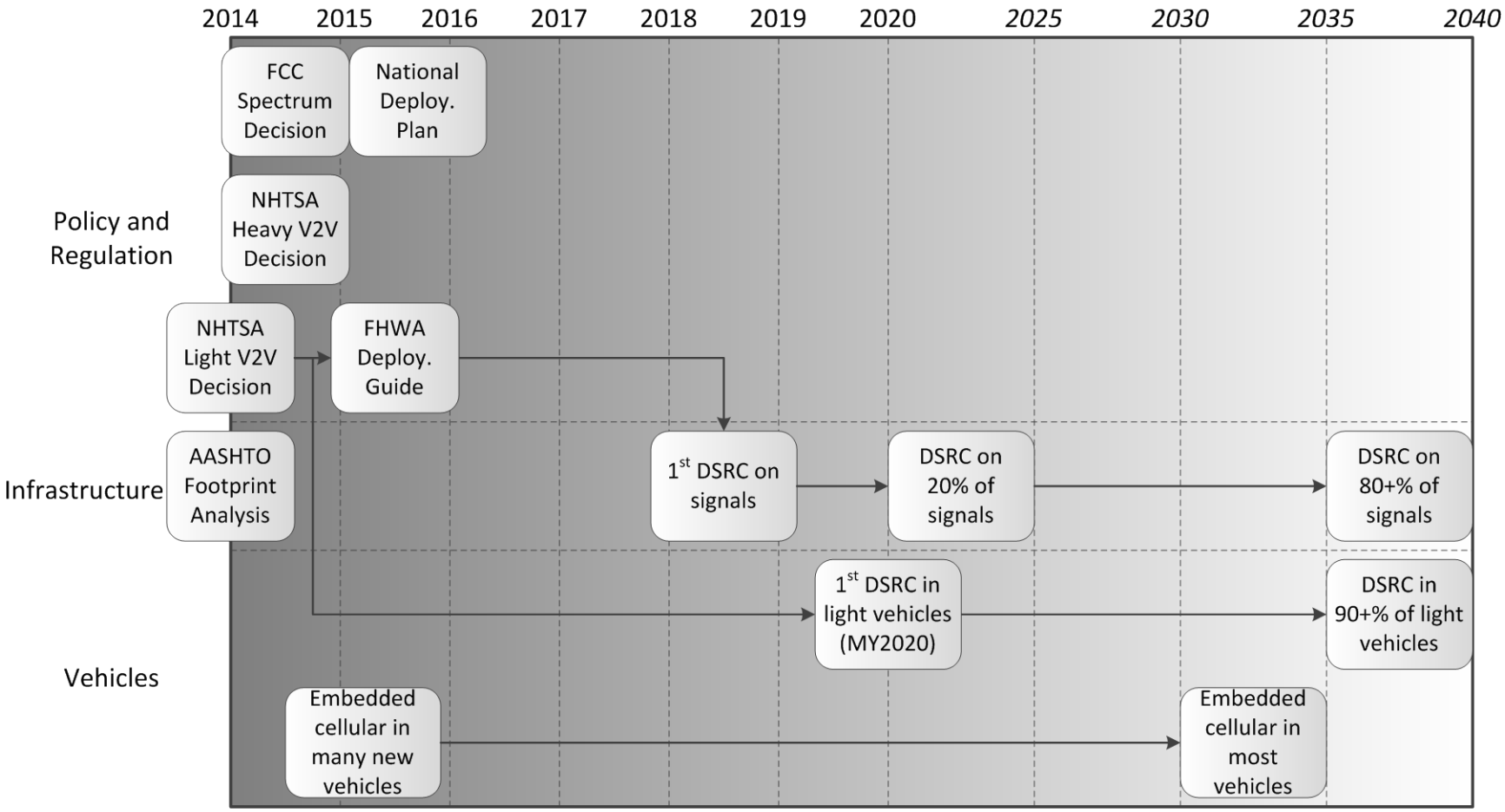
- 80% of traffic signals are V2I connected with DSRC
- 25,000 other local safety V2I connected devices
- Accurate real-time localized information on 90+% of roadway miles*
- Next-generation, multimodal, information-driven active traffic management deployed system-wide*

*enabled by both cellular and DSRC communications

Graphic Source: AASHTO

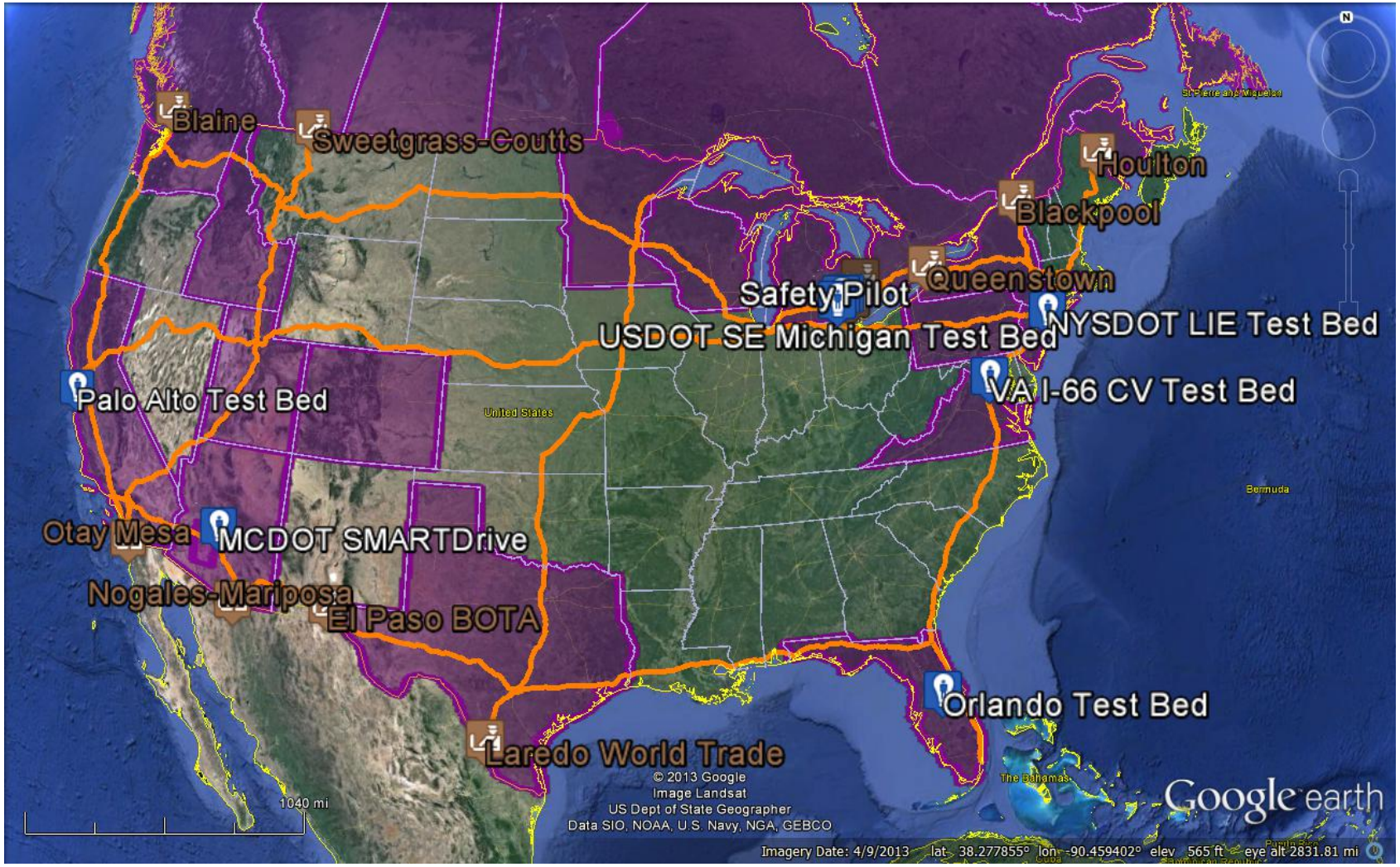
with financial contribution from:
Transport Canada Transports Canada

Estimated Deployment Timeline



Graphic Source: AASHTO

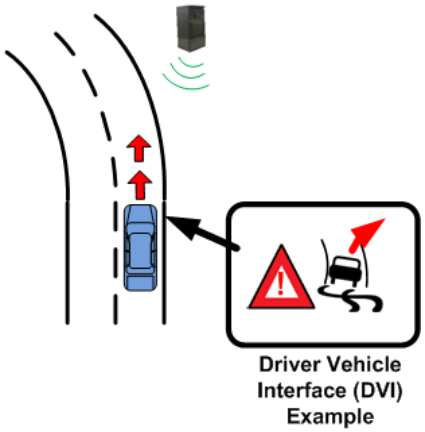
PFS States → Likely Early Deployments



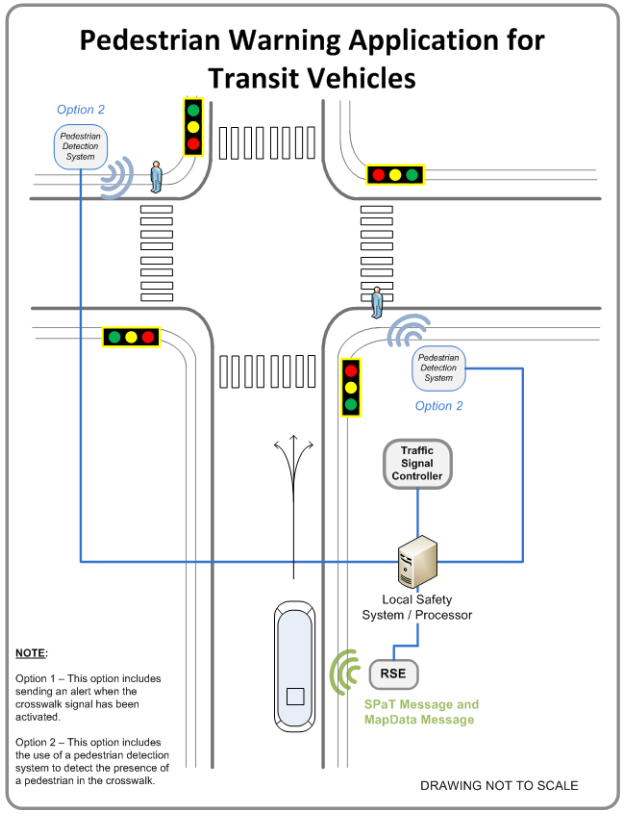
Graphic Source: AASHTO, Google Earth

V2I Safety Applications

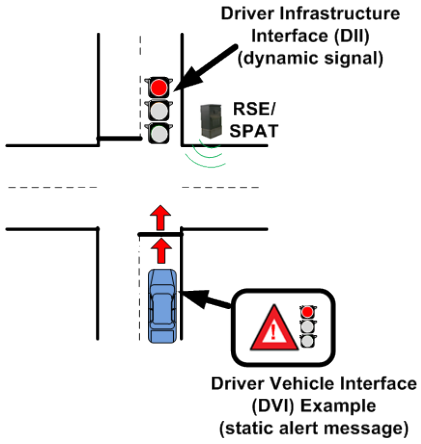
Curve Speed Warning



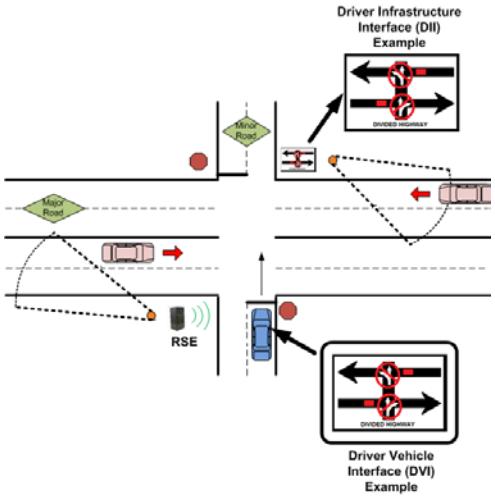
Smart Roadside



Red Light Violation Warning

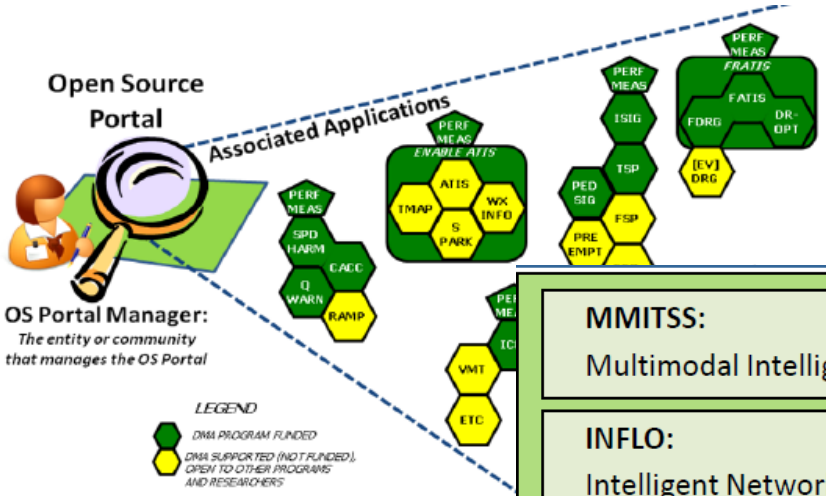


Stop Sign Gap Assist



Graphics/Image Source: USDOT

V2I Mobility Applications



MMITSS:
Multimodal Intelligent Traffic Signal System — **Ben McKeever**

INFLO:
Intelligent Network Flow Optimization — **Mohammed Yousuf**

R.E.S.C.U.M.E.:
Response, Emergency Staging and Communications, Uniform Management, and Evacuation — **Linda Dodge**

Enable ATIS:
Enable Advanced Traveler Information Systems — **Bob Rupert**

IDTO:
Intelligent Dynamic Transit Operations — **Ron Boenau**

FRATIS:
Freight Advanced Traveler Information Systems — **Randy Butler**

Other Programs: ICM, ATDM — **Weather**

Graphics Source: USDOT

DSRC Roadside Unit

- Specification 3.0 (prototype unit) is available
  - Used for Safety Pilot
  - http://www.its.dot.gov/safety_pilot/safety_pilot_qpl.htm
- Specification 4.0 underway (pre-production unit) based on lessons learned – due in Summer 2014
  - Purpose of Update: to improve performance reliability, strengthen security protocols and promote common configurations and user interfaces across different vendors
  - Key changes

Signal Phase and Timing Application

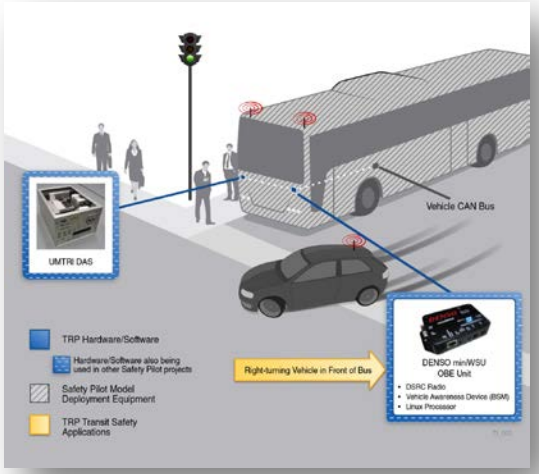
- SPaT tested in Safety Pilot:
  - 6 intersections
  - Transit application
  - SPaT data
- Deploying in Affiliated Test Beds to support testing of Multi-Modal Intelligent Traffic Signal System (MMITSS) applications
- ConOps, Interface Control documents, and System Requirements available now – ask Deborah.Curtis@dot.gov

What's Happening?

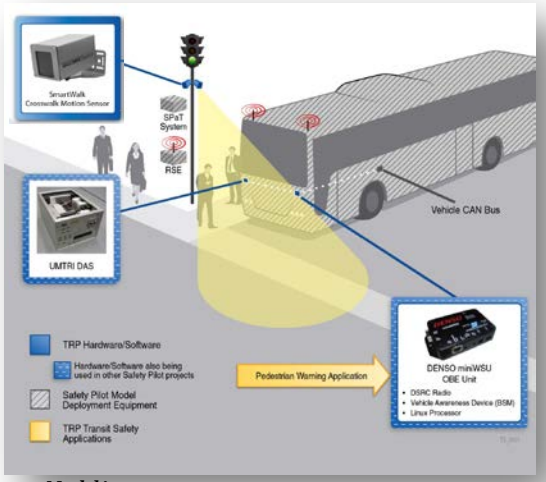
Jeffrey Spencer, Federal Transit Administration

TRP Retrofit and Applications

Right-Turn-In-Front Crash (V2V)



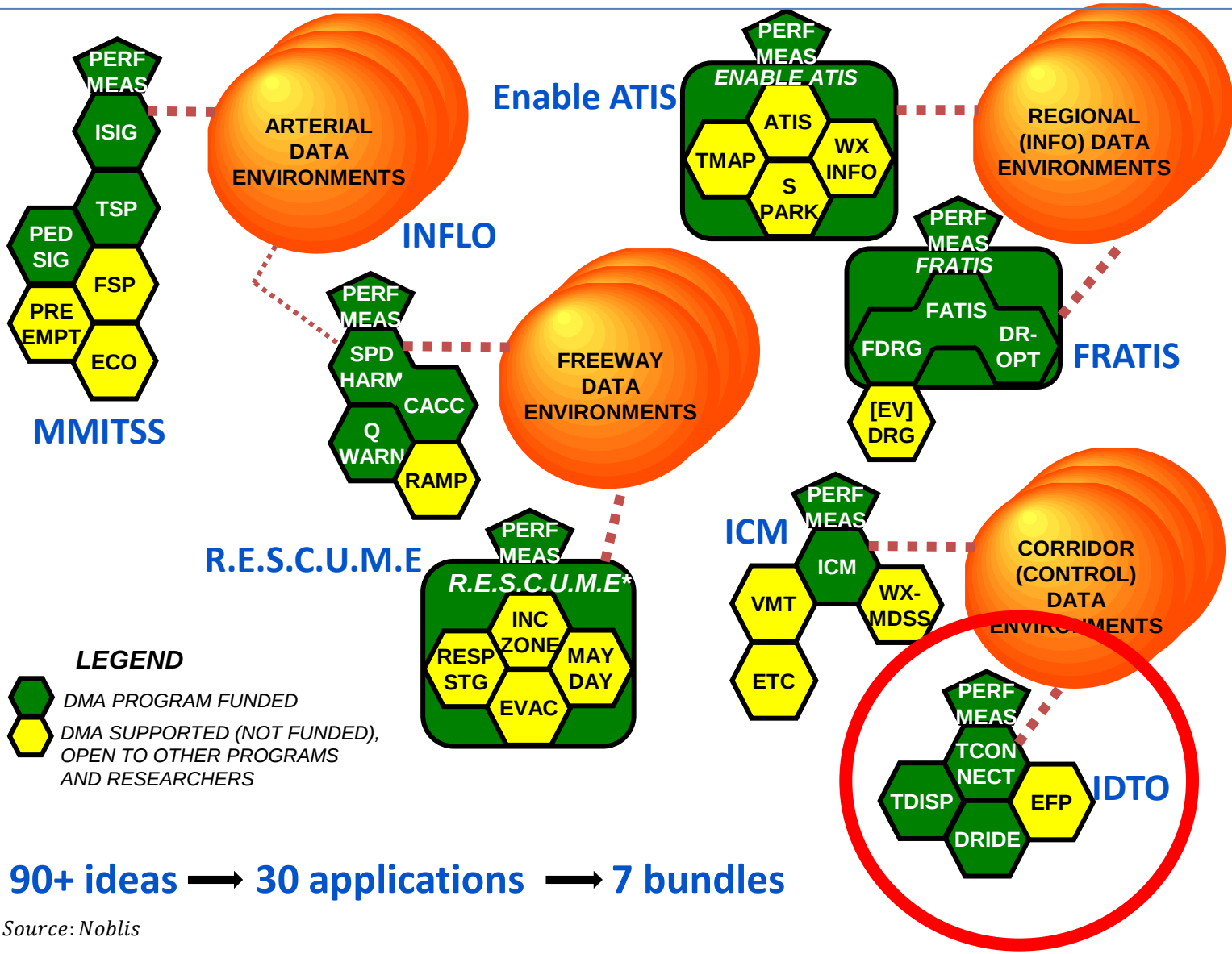
Pedestrian vs. Turning Bus Crash (V2I)



Graphics Source: Noblis

Images Source: USDOT

Data Environments and Mobility Bundles

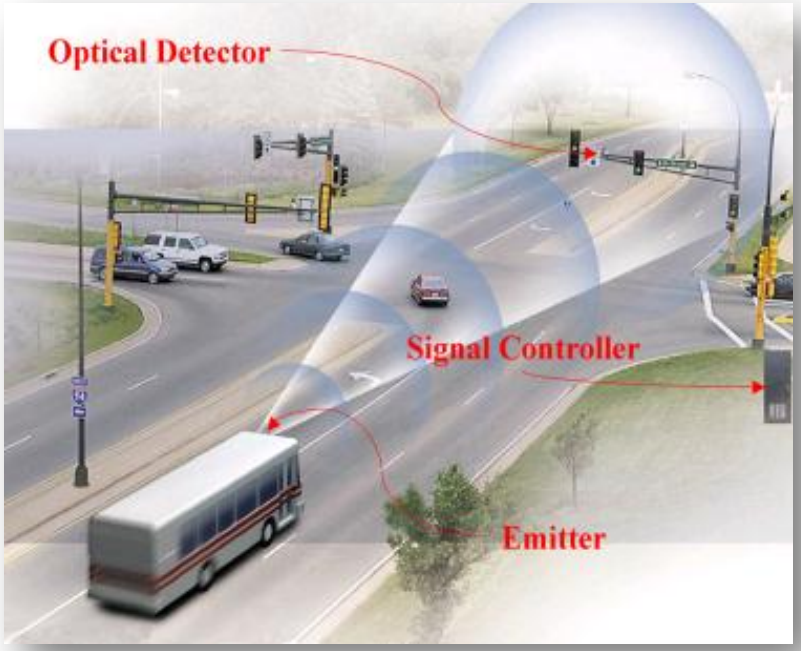


90+ ideas → 30 applications → 7 bundles

Graphic Source: Noblis

AERIS Transformative Concepts

- **Eco-Signal Operations**
- **Dynamic Eco-Lanes**
- **Dynamic Low Emissions Zones**
- **Eco-Traveler Information**
- **Support for Alternative Fuel Vehicle (AFV) Operations**



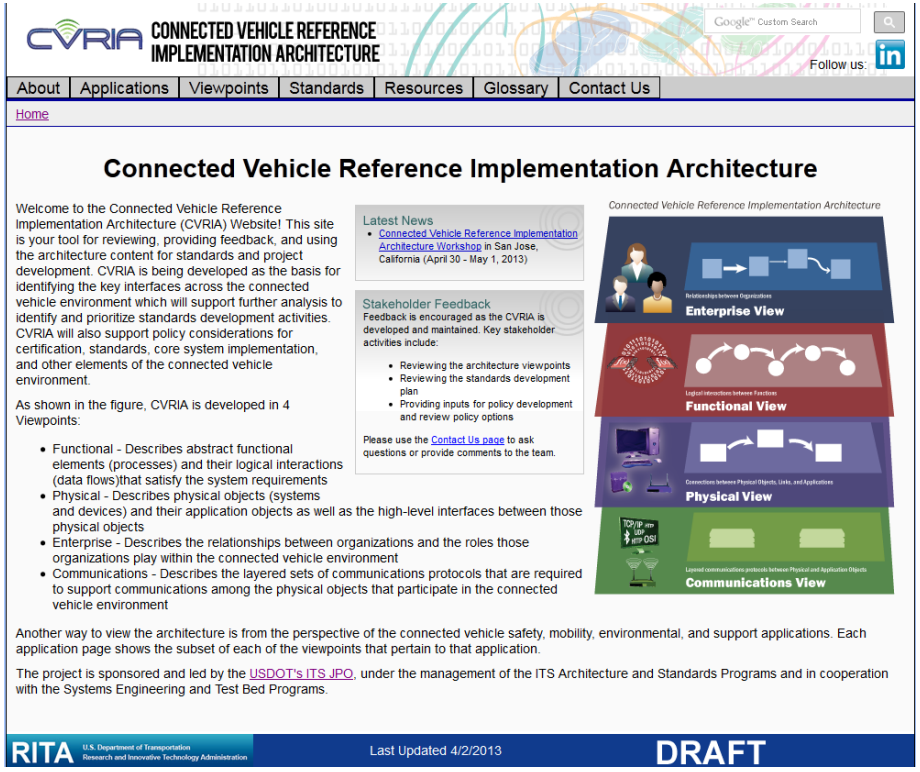
Graphics Source: Noblis

Enabling Technologies and Policy

- Architecture and Standards
- Security, Certification, Spectrum
- Data Environments

CVRIA

http://www.iteris.com/cvria/index.html



http://www.pcb.its.dot.gov/t3_archives.aspx

Graphics Source: USDOT

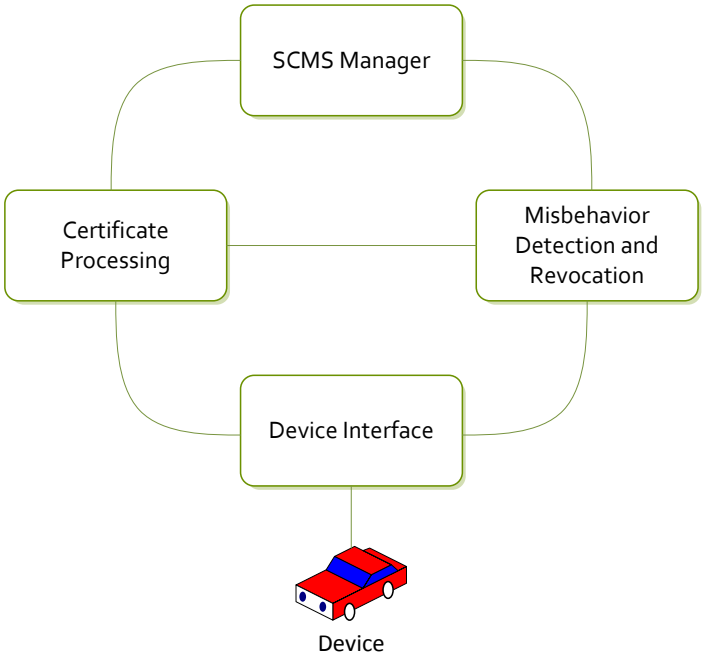
Next Step for CVRIA

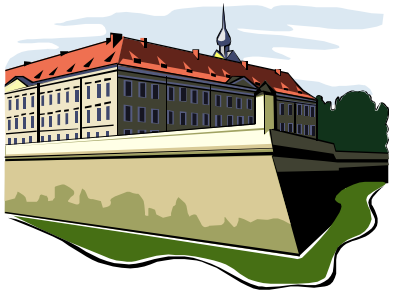
- WORKSHOP:
  - February 19-20, 2014
  - San Francisco, CA
- FOCUS: Proposing candidate Connected Vehicle (CV) interfaces for standardization
- Registration Announcement to be issued soon by ITS JPO. Registration through ITS America.

V2V Security Communications/ High Level Institutional Capabilities

Main Operations:

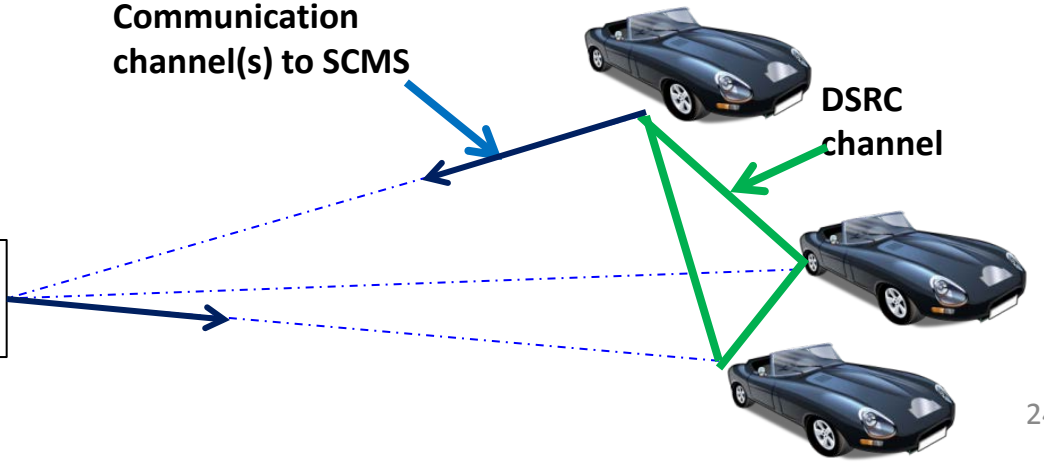
1. Device Initialization
2. Certificate Provisioning
3. Misbehavior Detection and Revocation





Security Credential Management System (SCMS)

Issue and renewal of certificates
Revocation of certificates



Graphics Source: USDOT, MicroSoft Clip Art

Policy Research

- Key research is ongoing in the areas of:
  - Security
  - Certification
  - Spectrum

Data Environment Policies

Managing Multi-Source Data

- Research Data Exchange
  - www.ITS-RDE.net
  - Leesburg Vehicle Awareness Devices
  - Pasadena network data
  - Multiple Other Sources
  - Safety Pilot – Coming Soon
- High quality, well documented data

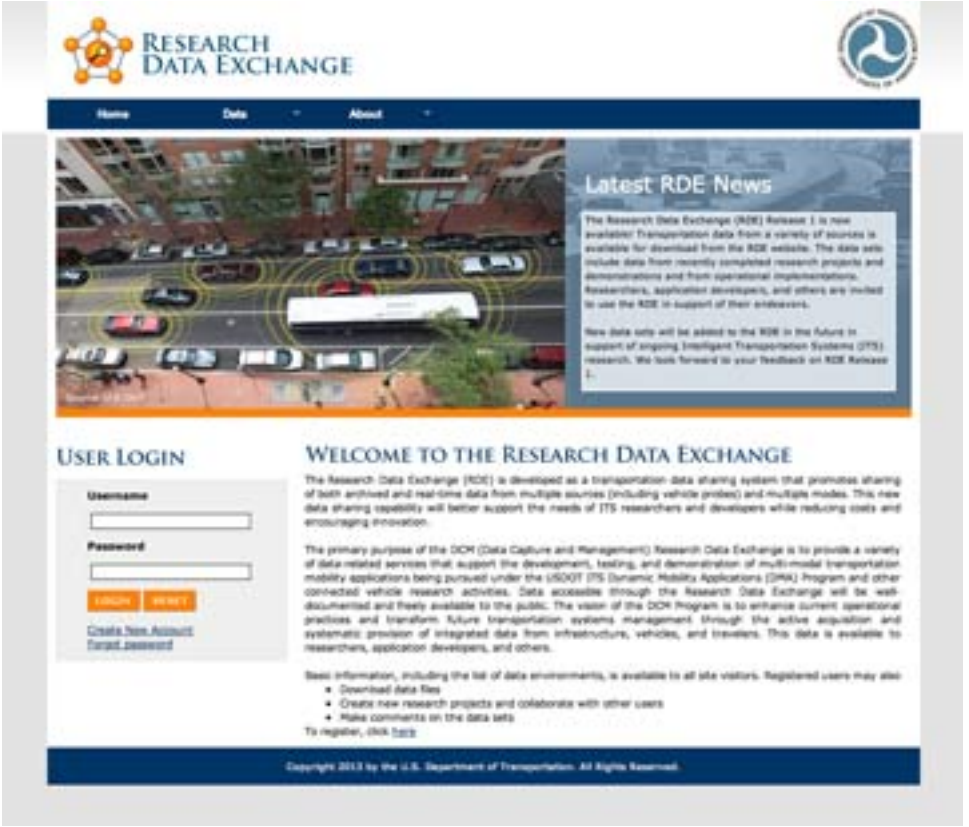
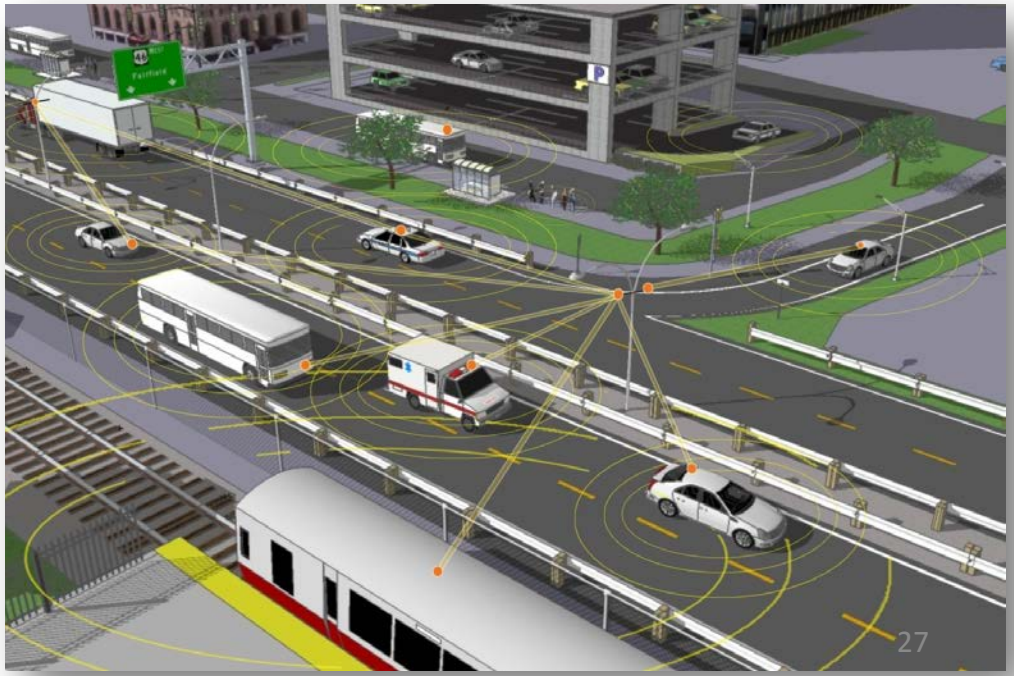


Image Source: USDOT

DEPLOYMENT IS NO LONGER JUST A CONCEPT!

- First generation vehicle and roadside technologies have been tested and are nearing completion
- Applications are being prototyped with planned testing in the near future
- Core and enabling technologies are emerging
- Initial timelines and deployment paths are emerging



Graphic Source: USDOT

Instructions for Break-Out Sessions

- Planning – Executive Room
- Design and Integration – Senate Room
- Institutional and Legal – Capitol Room
- Implementation – Embassy Room
- Operations – Calvert Room
- Transit/Multi-Modal – Stay in Hampton Room

Next Steps

- Develop a summary of today's meeting
  - Needs and priorities for FHWA guidance
  - Gaps/Open Questions
- Use input for analysis into FHWA process and decisions
- Continue to engage with stakeholders
  - Future thoughts after this meeting
  - Comments on materials / clarifications on topics

Summary of Break Out Sessions

- Planning – Executive Room
- Design and Integration – Senate Room
- Institutional and Legal – Capitol Room
- Implementation – Embassy Room
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